# The CALS Test Network MIL-D-28003 CGM Test Packet

## November 25, 1991

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**Prepared for**
Air Force Logistics Command

**Prepared by**
Lawrence Livermore National Laboratory

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## November 25, 1991

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Air Force Logistics Command

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## Preface

This CALS Test Network MIL-D-28003 (CGM) Test Packet is a document which will have periodic updates. These will occur as the reference images and their associated procedures, scripts, and files are corrected for oversights and/or are updated to new versions of the standards.

We acknowledge the following people for their technical assistance: Phil Andrews, Pittsburgh Supercomputing Center; Lofton Henderson, Henderson Software.

Please use the information contained in this packet at your own risk. Send recommendations for change or comments about the content to:

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## Abstract

This CALS Test Network MIL-D-28003 (CGM) Test Packet, together with the floppy disk described in Attachment A, contains information useful in conducting tests of the military specification MIL-D-28003 using CGM interpreters. The use of this material helps evaluate and demonstrate industry's and government's use of MIL-D-28003 in accordance with the CALS initiative. The CALS Test Network (CTN), the organization tasked with testing and demonstrating the CALS digital data interchange standards among industry and government, will use this packet in the tests that it conducts. The results derived from this testing will allow the CTN to suggest modifications to vendors' CGM software, the ANSI/ISO standard for CGM, and most importantly, the MIL-D-28003 military specification. However, the greatest use of this test packet is expected to be by industry and Service components as they test and evaluate their own CALS CGM capabilities independently of the CTN.

# 1 Introduction

The CALS Test Network (CTN) is a Department of Defense (DoD) and industry consortium within the Computer-aided Acquisition and Logistic Support (CALS) Program. It is tasked with testing and demonstrating the interchange of digital technical information using the CALS standards in user applications.

The CTN will use the Graphical Primitive elements reference Computer Graphics Metafile (CGM) described herein during transfer testing of CGM data. Specifically, this reference CGM (reference metafile) demonstrates the use of the CGM elements identified in the military specification MIL-D-28003. The results derived from this testing will allow the CTN to suggest modifications to vendors' CTN software, the ANSI/ISO standard for CGM, and most importantly, the MIL-D-28003 military specification, itself. However, the greatest use of this test packet is expected to be by industry and Service components as they test and evaluate their own CAL CGM capabilities independently of the CTN.

MIL-D-28003 defines a major subset of the ISO 8632 (CGM) standard format to be used for interchanging 2-dimensional (2-D) graphical data between dissimilar system. The CALS standards indicate that this subset is the preferred format for the interchange of technical publication illustrations; it is also beginning to be used for transferring 2-D engineering drawings.

# 2   Scope

The CTN Graphical Primitive Elements reference CGM is a metafile which contains instances of the 18 CGM primitives allowed by MIL-D-28003. While each allowable primitive is represented, some attribute elements are not covered. For example, the Graphical Primitive Elements reference metafile does not test an interpreter's ability to handle minimum and maximum values, to render all line types and hatch styles, to handle clipping, bundling, and escape elements, or to parse and skip any elements that the interpreter does not support. Later versions of this test packet will extend the scope.

It cannot be stressed enough that the purpose of CTN testing and of this test packet is to evaluate and demonstrate industry and government use of MIL-D-28003 and not to validate conformance of generators, interpreters, or metafiles to MIL-D-28003. The former testing is really "field" testing of the standard itself in an attempt to discover ambiguities and inconsistencies revealed by implementations. The latter testing validates specific files or interpreters/generators and in effect "guarantees" that they conform to MIL-D-28003; this type of testing is not within the CTN charter.

# 3 Technical Content of the MIL-D-28003 (CGM) Test Packet

The CTN MIL-D-28003 CGM Test Packet you are currently reading contains a set of reference materials that may be used to execute a test involving a vendor's CGM interpreter. It contains:

1. A listing of the contents of the CGM Test Packet Floppy Disk.

2. An illustration of how the Graphical Primitive Elements reference metafile should look.

3. A chart of the attributes used in the Graphical Primitive Elements reference metafile .

4. Procedures to follow in conducting a CGM interpreter test.

5. A floppy disk containing four different forms of the CTN Graphical Primitive Elements reference metafile.

6. An evaluation script (sets of questions) to complete after the Graphical Primitive Elements reference metafile has appeared on the screen.

7. A paper printout of the clear text forms of the Graphical Primitive Elements reference metafile. This is included for reference only.

8. A glossary listing.

9. A list of Acronyms and Abbreviations used.

With the exception of item 5, the floppy disk, the above-mentioned materials are contained in Attachments A through H.

# 4 Technical Content and Creation of the Reference Material

## 4.1 The CTN Graphical Primitive Elements Reference Metafile

The CTN Graphical Primitive Elements reference metafile is comprised of all the geometric and many of the annotation CGM elements identified in the MIL-D-28003 specification. The illustration is organized so the elements reside individually by element within one box of a grid. This grid box is labeled to show which element it should contain.

## 4.2 Development of the Reference CGMs

Both the real and integer forms of the Graphical Primitive Elements reference metafile were hand-created as clear text files, then translated into binary files via GPLOT, a copyrighted program available at no cost from Pittsburgh Supercomputing Center by downloading it over Internet. This hand-editing produced CGM files that incorporate all MIL-D-28003 graphical primitive elements and pass ValidCGM and MetaCALS CGM analyzers with no accountable errors.

One difficulty with designing a test CGM is the breadth of correct interpretations. For example, the description of the Restricted Text element states that the text must fit into a box, but does not describe how the text must fit. Therefore text which fits inside the box as closely as possible is as legal as text which fits anywhere inside the box. This yields different visual representations from the same CGM, which complicates a visual inspection for correctness. Future versions of the standard will not contain these ambiguities.

## 4.3 The Script

The test packet contains a script which describes how to evaluate the resulting illustration. The script asks questions that try to address DoD's present requirements for transfer of digital illustration data. Another evaluation aide, the CALS Test Network Transfer Test Procedure Checklist, is available separately from the CTN.

# 5   Conclusion

By following the procedures described in this CTN MIL-D-28003 (CGM) Test Packet and by referring to the script, plot, and data lists contained within, one can examine digital illustration transfers using CGM and MIL-D-28003. This packet does not validate a vendor's conformance to MIL-D-28003, but instead allows the CALS Test Network to demonstrate and evaluate industry/government use of the MIL-D-28003 specification. The packet is also useful to industry and Service components for independent evaluation of their internal MIL-D-28003 capabilities.

## ATTACHMENT A     Contents of the CTN MIL-D-28003 (CGM) Test Packet Floppy Disk

The floppy disk included with this CTN MIL-D-28003 (CGM) Test Packet contains four files, each a different representation (form) of the same image. These are version "D" of the reference metafiles.

CTN-01i.clr     This is a clear text CGM of the integer version of the Graphical Primitive Elements reference metafile. It is not a legal MIL-D-28003 file because it is not a binary format file. The binary version, CTN-01i.cgm, was translated from this file using GPLOT.

CTN-01i.cgm     This is the binary CGM of the integer version of the Graphical Primitive Elements reference metafile, created by translation from the clear text CGM, CTN-01i.clr. This metafile is a MIL-D-28003 file.

CTN-01r.clr     This is a clear text CGM of the real version of the Graphical Primitive Elements reference metafile. It is not a legal MIL-D-28003 file because it is not a binary format file. The binary version, CTN-01r.cgm, was translated from this file using GPLOT.

CTN-01r.cgm     This is the binary CGM of the real version of the Graphical Primitive Elements reference metafile, created by translation from the clear text CGM, CTN-01r.clr. This metafile is a MIL-D-28003 file.
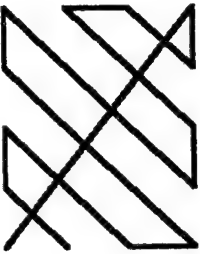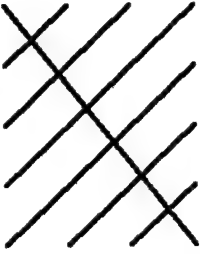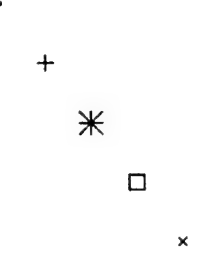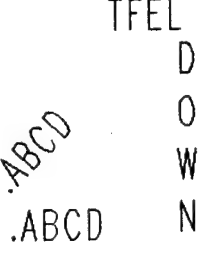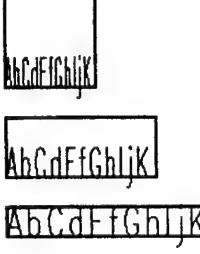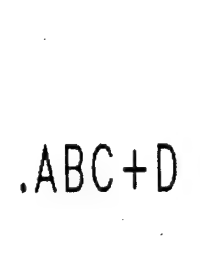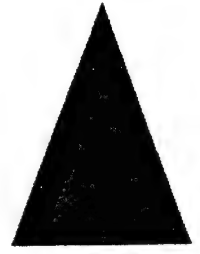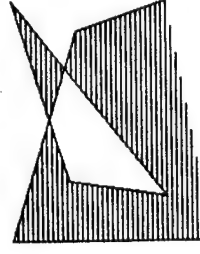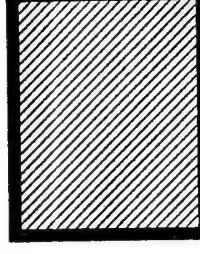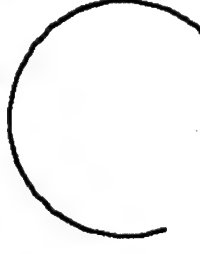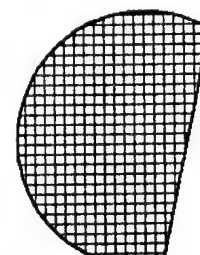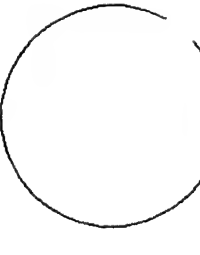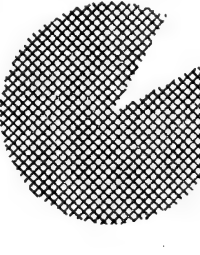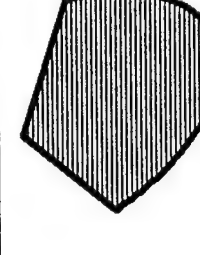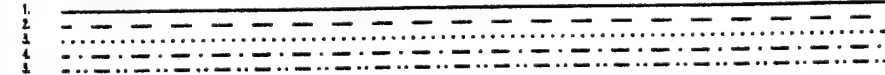
These files include the eighteen graphical primitive elements of CGM that are allowed under MIL-D-28003. Each is displayed in one of eighteen boxes in a three by six array. Only minimal use is made of attribute elements such as LINE WIDTH, LINE COLOUR, LINE TYPE, EDGE WIDTH, EDGE COLOUR, and EDGE TYPE. The eighteen boxes are numbered 1-9 and 11-19. Box 10, corresponding to the GENERALIZED DRAWING PRIMITIVE element, is not included since this element in not permitted by MIL-D-28003.

Text size and spacing were adjusted to give good appearance with one interpreter and may not "fit" as well when viewed with other CGM interpreters.

**ATTACHMENT B**        **Illustration of the CTN Graphical
Primitive Elements Reference Metafile**

Note: This plot incorrectly shows a square as one of the polymarkers. The square should be a circle. Also, the fill pattern in the circle and the ellipse are incorrect as shown.

| | | | | | |
|---|---|---|---|---|---|
| (1) POLYLINE | (2) DISJOINT POLYLINE | (3) POLYMARKER | (4) TEXT | (5) RESTRICTED TEXT | (6) APPEND TEXT |
| (7) POLYGON | (8) POLYGON SET | (9) CELL ARRAY | (11) RECTANGLE | (12) CIRCLE | (13) CIRCULAR ARC 3 POINT |
| (14) CIRCULAR ARC 3 POINT CLOSE | (15) CIRCULAR ARC CENTRE | (16) CIRCULAR ARC CENTRE CLOSE | (17) ELLIPSE | (18) ELLIPTICAL ARC | (19) ELLIPTICAL ARC CLOSE |

LINE TYPE

CALS TEST NETWORK
MIL-D-28003
Computer Graphics Metafile
File: CTN-01ld, Draft 91-10-03

**ATTACHMENT C**       **Attributes of the CTN Graphical
Primitive Elements Reference Metafile**

This plot shows the attributes used in each grid section.  It is included to assist visual inspection of the CGM.

| | | | | | |
|---|---|---|---|---|---|
| OPEN FIGURE:<br>LINE:<br>   Type.: solid<br>   Width: 4<br>   Color: red<br><br><br><br>(1) POLYLINE | OPEN FIGURE:<br>LINE:<br>   Type.: solid<br>   Width: 3<br>   Color: green<br><br><br><br>(2) DISJOINT<br>     POLYLINE | Marker:<br>Mark Size Color<br>  .   1   black<br>  +   2   red<br>  *   3   green<br>  o   2   blue<br>  x   1   magenta<br><br>(3) POLYMARKER | TEXT ELEMENT:<br>Font:<br>  SIMPLEX_ROMAN<br>String Orient Color<br>.ABCD  Right  magenta<br>.ABCD  Diag  orange<br> LEFT  Left  cyan<br> DOWN Down  blue<br><br>(4) TEXT | TEXT ELEMENT:<br>Font:<br>  SIMPLEX_ROMAN<br>CharHeight 0.02<br>CharSpace 0.25<br>Color: blue<br><br><br><br>(5) RESTRICTED<br>     TEXT | TEXT ELEMENT:<br>CharSpace 0.25<br>'.ABC'<br>   DUPLEX_ROMAN<br>   Height: 0.02<br>   Color: red<br>'+D'<br>   COMPLEX_ROMAN<br>   Height: 0.03<br>   Color: blue<br><br>(6) APPEND<br>    TEXT |
| CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 2<br>  Color: blue<br>  Vis: on<br>Fill −<br>  Type: solid<br>  Pattern: n/a<br>  Color: yellow<br><br>(7) POLYGON | CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 2<br>  Color: black<br>Fill −<br>  Type: hatch<br>  Pattern:<br>    Vert lines<br>  Color: yellow<br><br>(8) POLYGON<br>    SET | r . g . b . y . m<br>. c . . . r r . .<br>g c . . . . b r r<br>g . r r . c . . c<br>g . g . b . m . m<br>. r . g . m m . c<br>. g . . y . m g .<br>. b b . y g . b y<br>. y y . . g b . c<br>. m m . . g y . .<br><br>(9) CELL<br>   ARRAY | CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 10<br>  Color: cyan<br>Fill −<br>  Type: hatch<br>  Pattern:<br>    Diag lines //<br>  Color: magenta<br><br>(11) RECTANGLE | CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 4<br>  Color: green<br>Fill −<br>  Type: hatch<br>  Pattern:<br>    Diag lines \\<br>  Color: blue<br><br>(12) CIRCLE | OPEN FIGURE:<br>LINE:<br>  Type.: solid<br>  Width: 1<br>  Color: green<br><br><br><br><br><br>(13) CIRCULAR<br>    ARC 3 POINT |
| CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 2<br>  Color: yellow<br>Fill −<br>  Type: hatch<br>  Pattern: Xhatch<br>    Vert/Horiz<br><br>(14) CIRCULAR<br>    ARC 3 POINT<br>    CLOSE | OPEN FIGURE:<br>LINE:<br>  Type.: solid<br>  Width: 1<br>  Color: green<br><br><br><br><br><br>(15) CIRCULAR<br>    ARC CENTRE | CLOSED FIGURE:<br>Edge −<br>  Vis: OFF<br>  Width: 2<br>  Color: blue<br>Fill −<br>  Type: hatch<br>  Pattern: Xhatch<br>    Diag/Diag<br><br>(16) CIRCULAR<br>    ARC CENTRE<br>    CLOSE | CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 2<br>  Color: magenta<br>Fill −<br>  Type: hatch<br>  Pattern:<br>    Diag lines \\\<br><br>(17) ELLIPSE | OPEN FIGURE:<br>LINE:<br>  Type.: solid<br>  Width: 6<br>  Color: GREEN<br><br><br><br><br><br>(18) ELLIPTICAL<br>    ARC | CLOSED FIGURE:<br>Edge −<br>  Type: solid<br>  Width: 4<br>  Color: magenta<br>Fill −<br>  Type: hatch<br>  Pattern:<br>    Vert lines |||<br><br>(19) ELLIPTICAL<br>    ARC CLOSE |

| | |
|---|---|
| LINE TYPE<br><br>Line types: 1 solid, 2 dash, 3 dot, 4 dash-dot, 5 dash-dot-dot.<br>Line color: red    Line width: 2 | CALS TEST NETWORK<br>MIL-D-28003<br>Computer Graphics Metafile<br>File: CTN-01Rd/key, 91-10-02 |

## ATTACHMENT D          Procedures for Executing the CTN
## Reference CGM Interpreter Test

1.  Receive a floppy disk from the CALS Test Network containing the CTN Graphical Primitive Elements reference CGMs in MIL-D-28003 format.

2.  Process the binary files through your CGM interpreter.

3.  Inspect the resulting illustrations and answer the questions listed in the evaluation script (Attachment E).  If you answer "no" to any of the questions, explain why on the incident report sheets which follow the script.  Attach additional sheets if necessary.

4.  Generate a hard copy plot of CTN-01i.cgm and CTN-01r.cgm.

5.  If you are conducting a self-test, collect the script, plot, and any incident reports for self-evaluation. If you pre-arranged a formal CTN test and obtained CTN approval, send the completed evaluation script, plot, and any incident reports to the CALS Test Network Office Test Bed.

6.  Evaluate the data.  The CALS Test Network will, and anyone conducting a self-test should:

    a.  Examine the incident reports, plot, and evaluation script.

    b.  Pinpoint processor, CGM standard (ISO 8632), and/or military standard (MIL-D-28003) anomalies.

    c.  Bring the findings to the appropriate parties for correction (vendor, user, CGM Committee, or sponsor of the military standard).

    On CTN-arranged tests, the CTN will publicly publish results of findings.

## ATTACHMENT E    CTN Graphical Primitive Elements
## Reference Metafile Evaluation Script

For all elements, check visually against the supplied illustration of the CTN Graphical Primitive Elements reference metafile (Attachment B). The following script raises specific questions to assist in this visual inspection. In general, check that shape, size, line width, color (if used), and general text placement (i.e., somewhere in the box on restricted text, at the bottom of the cell on grid labels, etc.) agree between the resulting picture and the supplied illustration. Answer the script's questions. If you answer "No" to any of them, note why on the incident report sheets which follow this script.

The evaluation is numbered to correspond to the reference CGM illustration.

0)     OVERALL
_____ a)    Is the image divided into a grid with 20 boxes, 18 of which are the same size?
_____ b)    Are the grid lines black?

1)     POLYLINE
_____ a)    Does the shape match the shape of the included plot?
_____ b)    Is the line width larger than the width of the lines in the Disjoint Polyline element, but smaller than the width of the lines in the Elliptical Arc element?
_____ c)    Does the text string "(1) POLYLINE" appear near the bottom of the grid box?
_____ d)    If in color, are the lines red and the text black?

2)     DISJOINT POLYLINE
_____ a)    Does the shape match the shape of the included plot?
_____ b)    Does the line width match the width of the line in the Circular Arc 3 Point element?
_____ c)    Does the text string "(2) DISJOINT POLYLINE" appear near the bottom of the grid box?
_____ d)    If in color, are the lines green and the text black?

3)     POLYMARKER
_____ a)    Are the five POLYMARKERS, ".", "+", "*", "o", and "x" present and appearing in that order on a line running from the top left to the middle right of the grid? (Note: The illustration of reference metafile in Attachment B incorrectly shows a small square instead of a circle.)
_____ b)    Does the text string "(3) POLYMARKER" appear near the bottom of the grid?
_____ c)    Are the "." and "x" smaller than the "+" and " "? Are the "+" and " " smaller than the "*"?
_____ d)    If in color, is the "." black? Is the "+" red? Is the "*" green? Is the "o" blue? Is the "x" magenta?

4)     TEXT
_____ a)    Does the text string "LEFT" start near the upper right corner and print from right to left, so that it appears as "TFEL"? If using color, is the text cyan?
_____ b)    Does the text string "DOWN" start near the "L" in "TFEL", and print down, parallel to the right side of the grid box? If using color, is the text blue?
_____ c)    Is the text string ".ABCD" printed on the horizontal, roughly parallel with the N in "DOWN" ? If using color, is the text magenta?
_____ d)    Is the text string ".ABCD" printed on a roughly 45 degree angle with the "." almost aligned with the "." from the ".ABCD text string mentioned in the previous section? If in color, is the string orange?
_____ e)    Does the text string "(4) TEXT" appear near the bottom of the grid box? Is the string black?

**5)** **RESTRICTED TEXT**

a) Is the text string "AbCdEfGhIjK" printed inside the separate boxes within the grid box?

b) Is the box at the top of the grid box roughly square?

c) Does the middle box start even with the others on the left hand side and extend to just past half of the grid box width?

d) Does the last box start even with the others on the left hand side and extend to the right hand side of the grid box?

e) Does the text string fit within the box? Descenders may hang below the box.

f) Does the text string "(5) RESTRICTED TEXT" appear near the bottom of the grid box? Is this text black?

g) If in color, are the text boxes black? Is the text blue?

**6)** **APPEND TEXT**

a) Does the text string ".ABC+D" appear near the middle of the grid box?

b) Is the ".ABC" a smaller font than the "+D"? *(Note: the supplied plot does not correctly represent the relative size of the two test strings.)*

c) Does the text string "(6) APPEND TEXT" appear near the bottom of the grid box?

d) If in color, is the ".ABC" red? Is the "+D" in blue?

**7)** **POLYGON**

a) Does the large isosceles triangle match the shape of the triangle in the supplied plot?

b) Does the edge width match the edge width for the grid?

c) Does the text string "(7) POLYGON" appear near the bottom of the grid box?

d) If in color, is the triangle outline blue? Is the fill pattern yellow? Is the text black?

**8)** **POLYGON SET**

a) Does the polygon shape match the shape in the supplied plot?

b) Does the fill pattern consist of vertical equally-spaced parallel lines?

c) Is the rightmost edge line invisible?

d) Is the edge width narrower than the edge width for the grid?

e) Does the text string "(8) POLYGON SET" appear near the bottom of the grid box?

f) If in color, is the polygon edge black and is the fill pattern red? Is the text black?

**9)** **CELL ARRAY**

a) Does the cell array pattern match the pattern in the supplied plot? If in color, check that all colors match the chart which appears after question c.

b) Is the cell array skewed?

c) Does the text string "(9) CELL ARRAY" appear near the bottom of the grid box? Is the text black?

Color

```
+-------------------------------------+
|  r  .  g  .  b  .  y  .  m  |
|  .  c  .  .  .  r  r  .  .  |
|  g  c  .  .  .  .  b  r  r  |
|  g  .  r  r  .  c  .  .  c  |
|  g  .  g  .  b  .  m  .  m  |
|  .  r  .  g  .  m  m  .  c  |
|  .  g  .  .  y  .  m  g  .  |
|  .  b  b  .  y  g  .  b  y  |
|  .  y  y  .  .  g  b  .  c  |
|  .  m  m  .  .  g  y  .  .  |
+-------------------------------------+
```

| Key: | |
|---|---|
| X | Black |
| . | White |
| b | blue |
| c | cyan |
| g | green |
| y | yellow |
| m | magenta |
| r | red |

Black and White

```
+-------------------------------------+
|  X  .  X  .  X  .  X  .  X  |
|  .  X  .  .  .  X  X  .  .  |
|  X  X  .  .  .  .  X  X  X  |
|  X  .  X  X  .  X  .  .  X  |
|  X  .  X  .  X  .  X  .  X  |
|  .  X  .  X  .  X  X  .  X  |
|  .  X  .  .  X  .  X  X  .  |
|  .  X  X  .  X  X  .  X  X  |
|  .  X  X  .  .  X  X  .  X  |
|  .  X  X  .  .  X  X  .  .  |
+-------------------------------------+
```

10) **GENERALIZED DRAWING PRIMITIVE**

This element is not allowed by MIL-D-28003 and is not included in the reference CGM.

11) **RECTANGLE**
a) Does the rectangle shape match the shape in the supplied plot?
b) Is the edge width larger than the edge widths anywhere else in the plot?
c) Does the fill pattern consist of positive-slope equally-spaced parallel lines?
d) Are the fill pattern lines thinner than the rectangle edge lines?
e) Does the text string "(11) RECTANGLE" appear near the bottom of the grid box?
f) If in color, is the rectangle outline cyan? Is the text black? Is the fill pattern magenta?

12) **CIRCLE**
a) Does the circle shape match the shape in the supplied plot?
b) Does the edge width match the width of the edges in the Elliptical Arc Close element?
c) Does the fill pattern consist of negative slope equally spaced parallel lines? *(Note: The fill pattern in the supplied plot is not correct.)*
d) Does the text string "(12) CIRCLE" appear near the bottom of the grid box?
e) If in color, is the circle outline green? Is the fill pattern blue? Is the text black?

13)     **CIRCULAR ARC 3 POINT**

_____    a)    Does the circular arc shape match the shape in the supplied plot? Does the arc start and stop in the correct places?

_____    b)    Does the line width match the width of the lines in the Disjoint Polyline element?

_____    c)    Does the text string "(13) CIRCULAR ARC 3 POINT" appear near the bottom of the grid box?

_____    d)    If in color, is the arc green? Is the text black?

14)     **CIRCULAR ARC 3 POINT CLOSE**

_____    a)    Does the arc shape match the shape in the supplied plot? Is the arc closed with a chord closure?

_____    b)    Does the edge width match the width of the edges in the Polygon element?

_____    c)    Does the fill pattern consist of a horizontal and vertical crosshatch?

_____    d)    Does the text string "(14) CIRCULAR ARC 3 POINT CLOSE" appear near the bottom of the grid box?

_____    e)    If in color, is the arc outline orange? Is the fill pattern yellow? Is the text black?

15)     **CIRCULAR ARC CENTRE**

_____    a)    Does the arc shape match the shape in the supplied plot?

_____    b)    Is the edge width narrower than the width of the grid lines?

_____    c)    Does the text string "(15) CIRCULAR ARC CENTRE" appear near the bottom of the grid box?

_____    d)    If in color, is the arc outline green? Is the text black?

16)     **CIRCULAR ARC CENTRE CLOSE**

_____    a)    Does the arc shape match the shape in the supplied plot?

_____    b)    Is the closure a pie closure? Does the pie slice to the centre of the circle?

_____    c)    Is the edge invisible?

_____    d)    Does the fill pattern consist of positive-slope/negative-slope crosshatch?

_____    e)    Does the text string "(16) CIRCULAR ARC CENTRE CLOSE" appear near the bottom of the grid box?

_____    f)    If in color, is the fill pattern red? Is the text black?

17)     **ELLIPSE**

_____    a)    Does the ellipse shape match the shape in the supplied plot?

_____    b)    Is the ellipse slanted at roughly 45 degrees from the lower left to the upper right?

_____    c)    Does the edge width match the width of the edges of the Circular Arc 3 Point Close element?

_____    d)    Does the fill pattern consist of negative slope equally spaced parallel lines? _(Note: The fill pattern in the supplied plot is not correct.)_

_____    e)    Does the text string "(17) ELLIPSE" appear near the bottom of the grid box?

_____    f)    If in color, is the ellipse outline magenta? Is the fill pattern orange? Is the text black?

18)     **ELLIPTICAL ARC**

_____    a)    Does the arc shape match the shape n the supplied plot?

_____    b)    Does the line width match the larger than the lines in the Polyline element?

_____    c)    Does the text string "(18) ELLIPTICAL ARC" appear near the bottom of the grid box?

_____    d)    If in color, is the arc outline green? Is the text black?

19)    ELLIPTICAL ARC CLOSE
_____ a)    Does the circle shape match the shape in the supplied plot?
_____ b)    Does the edge width match the width of the edges of the Circle element?
_____ c)    Does the fill pattern consist of vertical equally spaced parallel lines?
_____ d)    Does the text string "(19) ELLIPTICAL ARC CLOSE" appear near the bottom of
             the grid box?
_____ e)    If in color, is the arc outline magenta?  Is the fill pattern green?  Is the text
             black?

20)    LINE TYPE
_____ a)    Are 5 distinct line types displayed?
_____ b)    Is the first a solid line?
_____ c)    Is the second a dashed line with long dashes?
_____ d)    Is the third a dashed line with short dashes?
_____ e)    Is the fourth a dashed line which alternates long and short dashes?
_____ f)    Is the fifth a dashed line which alternates a long and 2 short dashes?
_____ g)    If in color, are the lines red?

# Incident Report

# Incident Report

# Incident Report

**ATTACHMENT F**     **Clear Text Printout of the Graphical
Primitive Elements Reference CGM**

The following clear text listings were translated into binary to create MIL-D-28003 CGMs. The different element names used in each file (for example, LineType and line_type) represent different ways to specify the same element in a clear text file. The effect in the binary files is the same, so testers should not be confused by or concerned about the differences in syntax.

Listing for CTN-01i.clr
```
BegMF  "CTN-01id";                                          % 91-10-03 11:00 %
    MFVersion  1;
    MFDesc "CTN-01id, 91-10-03, MIL-D-28003/BASIC-1";
    MFElemList  "DRAWINGPLUS";
    VDCType INTEGER;
    MaxColrIndex 255;
    IntegerPrec -32768, 32768;
    ColrPrec 255;
    ColrIndexPrec 255;
    FontList  "HERSHEY:SIMPLEX_ROMAN" "HERSHEY:DUPLEX_ROMAN"
          "HERSHEY:COMPLEX_ROMAN";

BegPic "All Graphical Primitive Elements";
    ColrMode INDEXED;
    LineWidthMode  SCALED;
    MarkerSizeMode SCALED;
    EdgeWidthMode SCALED;
    VDCExt 0,0,32767, 32767;
    BackColr 255 255 255;        % white %
```

| % MODE | SUMMARY | | | | % |
|---|---|---|---|---|---|
| % | COLOUR | LINE WIDTH | MARKER SIZE | EDGE WIDTH | % |
| % SCALING | SELECTION | SECIFICATION | SPECIFICATION | SPECIFICATION | % |
| % default | INDEXED | SCALED | SCALED | SCALED | % |

```
BegPicBody;
    ColrTable    0                     %     index     color        %
              255  255  255            %     0         white        %
                0    0    0            %     1         black        %
              255    0    0            %     2         red          %
                0  255    0            %     3         green        %
                0    0  255            %     4         blue         %
              255  255    0            %     5         yellow       %
              255    0  255            %     6         magenta      %
                0  255  255            %     7         cyan         %
              255  255  255            %     8         white        %
              255  155    0;           %     9         orange       %
```

% Box Grid %
    EdgeVis ON;
    EdgeWidth 2.0;
    LineType 1;
    LineWidth 2.0;
    LineColr 1;
    % box and horizontal grid lines %
    % LINE Parameter Summary -------------------------------------------------- %
    % BUNDLE     LINE        LINE        LINE                                    %
    % INDEX      TYPE        WIDTH       COLOUR                                  %
    % default    set         set         set                                    %
    % 1          1           3.0         2 black                                %
    % ------------------------------------------------------------------------- %
    Line (0,0) (0,32767) (32767,32767) (32767,0) (0,0);
    Line (0,22937) (32767,22937);
    Line (0,13107) (32767,13107);
    Line (0,3277) (32767,3277);

    % vertical grid lines %
    Line (5461,3277) (5461,32767);
    Line (10922,3277) (10922,32767);
    Line (16384,3277) (16384,32767);
    Line (21845,0) (21845,32767);
    Line (27306,3277) (27306,32767);

% Elements %

% Box 1 - POLYLINE %
    LineWidth 4.0;
    LineColr 2;
    % LINE Parameter Summary -------------------------------------------------- %
    % BUNDLE     LINE        LINE        LINE                                    %
    % INDEX      TYPE        WIDTH       COLOUR                                  %
    % default    set         set         set                                    %
    % 1          1           4.0         2 red                                  %
    % ------------------------------------------------------------------------- %
    Line    (655,26869) (4806,32112)     (4806,30801) (3386,32112)
            (2021,32112) (4806,29490)    (4806,28180) (655,32112)
            (655,30801) (4806,26869)     (3386,26869) (655,29490)
            (655,28180) (2021,26869);

% Box 2 - DISJOINT POLYLINE %
    LineWidth 3.0;
    LineColr 3;
    % LINE Parameter Summary -------------------------------------------------- %
    % BUNDLE     LINE        LINE        LINE                                    %
    % INDEX      TYPE        WIDTH       COLOUR                                  %
    % default    set         set         set                                    %
    % 1          1           3.0         3 green                                %
    % ------------------------------------------------------------------------- %
    DisjtLine  (10267,26869) (6117,32112)     (6117,30801) (7482,32112)
               (8847,32112) (6117,29490)      (6117,28180) (10267,32112)
               (10267,30801) (6117,26869)     (7482,26869) (10267,29490)
               (10267,28180) (8847,26869);

% Box 3 - POLYMARKER %
    MarkerType 1;
    MarkerSize 1.0;
    MarkerColr 1;
    % MARKER PARAMETER SUMMARY ------------------------------------ %
    % BUNDLE                                                        %
    % INDEX        TYPE     SIZE     COLOUR                         %
    % default = 1    1      1.0      1 black                        %
    % -------------------------------------------------------------- %
    Marker (11468,32112);

    MarkerType 2;
    MarkerSize 2.0;
    MarkerColr 2;
    % MARKER PARAMETER SUMMARY ------------------------------------ %
    % BUNDLE                                                        %
    % INDEX        TYPE     SIZE     COLOUR                         %
    % default = 1    2      2.0      2 red                          %
    % -------------------------------------------------------------- %
    Marker (12451,30801);

    MarkerType 3;
    MarkerSize 3.0;
    MarkerColr 3;
    % MARKER PARAMETER SUMMARY ------------------------------------ %
    % BUNDLE                                                        %
    % INDEX        TYPE     SIZE     COLOUR                         %
    % default = 1    3      3.0      3 green                        %
    % -------------------------------------------------------------- %
    Marker (13434,29490);

    MarkerType 4;
    MarkerSize 2.0;
    MarkerColr 4;
    % MARKER PARAMETER SUMMARY ------------------------------------ %
    % BUNDLE                                                        %
    % INDEX        TYPE     SIZE     COLOUR                         %
    % default = 1    4      2.0      4 blue                         %
    % -------------------------------------------------------------- %
    Marker (14417,28180);

    MarkerType 5;
    MarkerSize 1.0;
    MarkerColr 6;
    % MARKER PARAMETER SUMMARY ------------------------------------ %
    % BUNDLE                                                        %
    % INDEX        TYPE     SIZE     COLOUR                         %
    % default = 1    5      1.0      6 magenta                      %
    % -------------------------------------------------------------- %
    Marker (15400,26869);

% Box 4 - TEXT %
    TextFontIndex 1;
    TextColr 6;
    CharHeight 655;
    CharExpan 0.8;
    CharSpace 0.25;
    CharOri 0,1,1,0;

% TEXT PARAMETER SUMMARY --------------------------------------------------------- %

| % BUNDLE INDEX | FONT INDEX | TEXT PRECISION | EXPAN FACTOR | CHAR. SPACE | TEXT COLOUR | % % |
|---|---|---|---|---|---|---|
| % default | set | default | set | set | set | % |
| % 1 | 1 | 1 | 0.8 | 0.25 | 6 magenta | % |
| % | | | | | | % |
| % CHAR HEIGHT | CHAR. ORIENT | TEXT PATH | TEXT ALIGN | CHAR SET INDEX | ALT CHAR SET INDEX | % % |
| % set | set | default | default | default | default | % |
| % 655 | 0,1,1,0 | right | normal | 1 | 1 | % |
| % | | | | | | % |

% --------------------------------------------------------------------------------

Text 17039,26869,final,".ABCD";


    TextColr 9;
    CharOri -1,1,1,1;

% TEXT PARAMETER SUMMARY --------------------------------------------------------- %

| % BUNDLE INDEX | FONT INDEX | TEXT PRECISION | EXPAN FACTOR | CHAR. SPACE | TEXT COLOUR | % % |
|---|---|---|---|---|---|---|
| % default | set | default | set | set | set | % |
| % 1 | 1 | 1 | 0.8 | 0.25 | 9 orange | % |
| % | | | | | | % |
| % CHAR HEIGHT | CHAR. ORIENT | TEXT PATH | TEXT ALIGN | CHAR SET INDEX | ALT CHAR SET INDEX | % % |
| % set | set | default | default | default | default | % |
| % 655 | -1,1,1,1 | right | normal | 1 | 1 | % |
| % | | | | | | % |

% --------------------------------------------------------------------------------

Text 17039,27852,final,".ABCD";


    TextColr 7;
    CharOri 0,1,1,0;
    TextPath LEFT;

% TEXT PARAMETER SUMMARY --------------------------------------------------------- %

| % BUNDLE INDEX | FONT INDEX | TEXT PRECISION | EXPAN FACTOR | CHAR. SPACE | TEXT COLOUR | % % |
|---|---|---|---|---|---|---|
| % default | set | default | set | set | set | % |
| % 1 | 1 | 1 | 0.8 | 0.25 | 7 cyan | % |
| % | | | | | | % |
| % CHAR HEIGHT | CHAR. ORIENT | TEXT PATH | TEXT ALIGN | CHAR SET INDEX | ALT CHAR SET INDEX | % % |
| % set | set | set | default | default | default | % |
| % 655 | 0,1,1,0 | left | normal | 1 | 1 | % |
| % | | | | | | % |

% --------------------------------------------------------------------------------

Text 20971,31456,final,"LEFT";

```
TextColr 4;
TextPath DOWN;
```

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | default | set | set | set | % |
| % 1 | 1 | 1 | 0.8 | 0.25 | 4 blue | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 655 | 0,1,1,0 | down | normal | 1 | 1 | % |
| % -------- | | | | | | % |

```
Text 20971,31456,final,"DOWN";
```

% Box 5 - RESTRICTED TEXT %

```
LineType 1;
IntStyle EMPTY;
TextColr 4;
CharHeight 655;
TextPath RIGHT;
```

| % CLOSED FIGURE PARAMETER SUMMARY | | | | | | | % |
|---|---|---|---|---|---|---|---|
| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % EMPTY | set | default | default | INDEX | default | default | % |
| % | 4 blue | 1 = | 1 | def = 1 | 1 | | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | | | | | % |
| % COLOUR | VISIBIL. | POINT | | | | | % |
| % | set | default | | | | | % |
| % | on | ll corn | | | | | % |
| % -------- | | | | | | | % |

```
Rect 22282,26869,26869,27524;
Rect 22282,28180,25558,29490;
Rect 22282,30146,24248,32112;
```

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | default | set | set | set | % |
| % 1 | 1 | 1 | 0.8 | 0.25 | 4 blue | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 655 | 0,1,1,0 | right | normal | 1 | 1 | % |
| % -------- | | | | | | % |

```
RestrText 4587,1311,22282,26869,final,"AbCdEfGhIjK";
RestrText 3277,1638,22282,28180,final,"AbCdEfGhIjK";
RestrText 1966,1966,22282,30146,final,"AbCdEfGhIjK";
```

% Box 6 - APPEND TEXT %
    TextFontIndex 2;
    TextColr 2;
    CharHeight 666;
    CharExpan 0.8;
    CharSpace 0.10;
    CharOri 0,1,1,0;

% TEXT PARAMETER SUMMARY --------------------------------------------------------- %

| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| default | set | default | set | set | set | % |
| 1 | 2 | 1 | 0.8 | 0.10 | 2 red | % |
| | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| set | set | default | default | default | default | % |
| 666 | 0,1,1,0 | right | normal | 1 | 1 | % |

% ---------------------------------------------------------------------------------- %

    Text 27961,27852,notfinal,".ABC";

    TextFontIndex 3;
    TextColr 4;
    CharHeight 1000;

% TEXT PARAMETER SUMMARY --------------------------------------------------------- %

| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| default | set | default | set | set | set | % |
| 1 | 3 | 1 | 0.8 | 0.10 | 4 blue | % |
| | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| set | set | set | default | default | default | % |
| 1000 | 0,1,1,0 | right | normal | 1 | 1 | % |

% ---------------------------------------------------------------------------------- %

    ApndText final,"+D";

% Box 7 - POLYGON %
    EdgeWidth 2.0;
    EdgeColr 4;
    IntStyle SOLID;
    HatchIndex 1;
    FillColr 5;

% CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------------- %

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
| STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| set | set | set | default | INDEX | default | set | % |
| SOLID | 5 yellow | 1= | 1 | def = 1 | 1 | 2.0 | % |
| | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| set | set | default | default | default | | | % |
| 4 blue | on | ll corn | 1 | 1 | | | % |

% ---------------------------------------------------------------------------------- %

    Polygon (655,17039) (2731,22282) (4587,17039);

% Box 8 - POLYGON SET %
    IntStyle HATCH;
    FillColr 2;
    HatchIndex 2;
    EdgeWidth 1.0;
    EdgeColr 1;

| % CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------------------- % |
|---|

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
|---|---|---|---|---|---|---|---|
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | set | default | INDEX | default | set | % |
| % HATCH | 2 red | 2 \|\|\| | 1 | def = 1 | 1 | 1.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| % COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| % set | set | default | default | default | | | % |
| % 4 blue | on | ll corn | 1 | 1 | | | % |
| % ---------------------------------------------------------------------------------- | | | | | | | % |

    PolygonSet (6117,17039),vis,(7536,21626,vis, (9502,22282),invis, (10485,17039),closevis,
        (7373,18350),vis, (6117,22282),vis, (9502,18022),closevis;

% Box 9 - CELL ARRAY %
    CellArray

| % | P | | Q | | R | | nx | ny | CI | % |
|---|---|---|---|---|---|---|---|---|---|---|
| | (12468,22282) | | (14500,17039) | | (15728,22282) | | 9 | 10 | 65535 | |
| | 2 | 0 | 3 | 0 | 4 | 0 | 5 | 0 | 6 | % 1 0 1 0 1 0 1 0 1 % |
| | 0 | 7 | 8 | 0 | 0 | 2 | 2 | 0 | 0 | % 0 1 1 0 0 1 1 0 0 % |
| | 3 | 7 | 8 | 0 | 0 | 0 | 4 | 2 | 2 | % 1 1 1 0 0 0 1 1 1 % |
| | 3 | 0 | 2 | 2 | 0 | 7 | 0 | 0 | 7 | % 1 0 1 1 0 1 0 0 1 % |
| | 3 | 0 | 3 | 0 | 4 | 0 | 6 | 0 | 6 | % 1 0 1 0 1 0 1 0 1 % |
| | 0 | 2 | 0 | 3 | 0 | 6 | 6 | 0 | 7 | % 0 1 0 1 0 1 1 0 1 % |
| | 0 | 3 | 0 | 0 | 5 | 0 | 6 | 3 | 0 | % 0 1 0 0 1 0 1 1 0 % |
| | 0 | 4 | 4 | 0 | 5 | 3 | 0 | 4 | 5 | % 0 1 1 0 1 1 0 1 1 % |
| | 0 | 5 | 5 | 0 | 0 | 3 | 4 | 0 | 7 | % 0 1 1 0 0 1 1 0 1 % |
| | 0 | 6 | 6 | 0 | 0 | 3 | 5 | 0 | 0; | % 0 1 1 0 0 1 1 0 0 % |

% Box 10 not used; GDP not in MIL-D-28003 %

% Box 11 - RECTANGLE %
    FillColr 6;
    HatchIndex 3;
    EdgeWidth 10.0;
    EdgeColr 7;

| % CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------------- % |
|---|

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
|---|---|---|---|---|---|---|---|
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | set | default | INDEX | default | set | % |
| % HATCH | 6 magenta | 3 /// | def = 1 | 1 | 1 | 10.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| % COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| % set | set | default | default | default | | | % |
| % 7 cyan | on | ll corn | 1 | 1 | | | % |
| % ---------------------------------------------------------------------------------- | | | | | | | % |

    Rect (17039,17039) (21189,22282);

% Box 12 - CIRCLE %
    FillColr  4;
    HatchIndex 4;
    EdgeWidth  4.0;
    EdgeColr 3;
    % CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------------------- %

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
|---|---|---|---|---|---|---|---|
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | set | default | INDEX | default | set | % |
| % HATCH | 4 blue | 4 \\\ | 1 | def = 1 | 1 | 4.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| % COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| % set | set | default | default | default | | | % |
| % 3 green | on | ll corn | 1 | 1 | | | % |

    %  ---------------------------------------------------------------------------------- %
    Circle (24575,19660),2458;


% Box 13 - CIRCULAR ARC 3 POINT %
    LineType 1;
    % LINE Parameter Summary -------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|---|---|---|---|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 1 | 3.0 | 3 green | % |

    %  -------------------------------------------------------------------- %
    Arc3Pt (32112,21299) (28398,17694) (31129,17039);


% Box 14 - CIRCULAR ARC 3 POINT CLOSE (CHORD) %
    FillColr 5;
    HatchIndex 5;
    EdgeWidth 2.0;
    EdgeColr 9;
    % CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------------------- %

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
|---|---|---|---|---|---|---|---|
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | set | default | INDEX | default | set | % |
| % HATCH | 5 yellow | 4  ### | 1 | def = 1 | 1 | 2.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| % COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| % set | set | default | default | default | | | % |
| % 9 orange | on | ll corn | 1 | 1 | | | % |

    %  ---------------------------------------------------------------------------------- %
    Arc3PtClose (4915,11796) (1092,7864) (3823,6553),chord;

% BOX 15 - CIRCULAR ARC CENTRE %
    LineWidth 1.0;
    LineType 1;
    % LINE Parameter Summary ------------------------------------------- %
    % BUNDLE      LINE      LINE      LINE                                %
    % INDEX       TYPE      WIDTH     COLOUR                              %
    % default     set       set       set                                %
    % 1           1         1.0       3 green                            %
    % ---------------------------------------------------------------- %
    %           x       y       DXs     DYs     DXe     DYe     rad       %
    ArcCtr    8192,   9830,   5898,   10485,  9175,   8192,   2458;

% Box 16 - CIRCULAR ARC CENTRE CLOSE (PIE) %
    HatchIndex 6;
    FillColr 2;
    EdgeColr 4;
    EdgeVis OFF;
    % CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------- %
    % INTERIOR    FILL      HATCH     PATTERN     EDGE       EDGE       EDGE      %
    % STYLE       COLOUR    INDEX     INDEX       BUNDLE     TYPE       WIDTH     %
    % set         set       set       default     INDEX      default    set       %
    % HATCH       2 red     6 xxx     1           def = 1    1          2.0       %
    %                                                                            %
    % EDGE        EDGE      FILL REF  CHAR SET    ALT CHR                         %
    % COLOUR      VISIBIL.  POINT     INDEX       SET NDX                         %
    % set         set       default   default     default                        %
    % 4 blue      off       ll corn   1           1                              %
    % ---------------------------------------------------------------- %
    %             x       y       DXs     DYs     DXe     DYe     rad    type     %
    ArcCtrClose   13631,  9830,   5898,   10485,  15728,  8192,   2458,   pie;

% Box 17 - ELLIPSE %
    FillColr 9;
    HatchIndex 4;
    EdgeColr 6;
    EdgeVis ON;
    % CLOSED FIGURE PARAMETER SUMMARY ---------------------------------------- %
    % INTERIOR    FILL      HATCH     PATTERN     EDGE       EDGE       EDGE      %
    % STYLE       COLOUR    INDEX     INDEX       BUNDLE     TYPE       WIDTH     %
    % set         set       set       default     INDEX      default    set       %
    % HATCH       9 orange  4 \\\     1           def = 1    1          2.0       %
    %                                                                            %
    % EDGE        EDGE      FILL REF  CHAR SET    ALT CHR                         %
    % COLOUR      VISIBIL.  POINT     INDEX       SET NDX                         %
    % set         set       default   default     default                        %
    % 6 magenta   on        ll corn   1           1                              %
    % ---------------------------------------------------------------- %
    Ellipse (19114,9830) 16973,7864,18022,10485;

% Box 18 - ELLIPTICAL ARC %
    LineWidth 6.0;
    LineType 1;
    % LINE Parameter Summary -------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 1 | 6.0 | 3 green | % |

    % -------------------------------------------------------------------- %
    EllipArc (22282,9175)      % centre point    %
            (19158,6226)      % 1st CDP endpoint    %
            (19551,10158)    % 2nd CDP endpoint    %
            (1311,3604)      % DX_start,DY_start    %
            (3277,-2949);    % DX_end,DY_end    %

% Box 19 - ELLIPTICAL ARC CLOSE (PIE) %
    FillColr 3;
    HatchIndex 2;
    EdgeWidth 4.0;
    % CLOSED FIGURE PARAMETER SUMMARY --------------------------------------------- %

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
|------------|------|-------|---------|------|------|------|---|
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | set | default | INDEX | default | set | % |
| % HATCH | 3 green | 2 ||| | 1 | def = 1 | 1 | 4.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| % COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| % set | set | default | default | default | | | % |
| % 6 magenta | on | ll corn | 1 | 1 | | | % |

    % --------------------------------------------------------------------------- %
    EllipArcClose (27852,9175)    % centre point    %
              (24575,6226)    % 1st CDP endpoint    %
             (24903,10158)    % 2nd CDP endpoint    %
            (1311,3932)     % DX_start,DY_start    %
            (3277,-2621)     % DX_end,DY_end    %
            pie;

% Box "20" - LINE TYPE %
    LineColr 2;
    LineWidth 2.0;
    LineType 5;
    % LINE Parameter Summary -------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 5 dash-dot-dot | 2.0 | 2 red | % |

    % -------------------------------------------------------------------- %
    Line (1638,655) (19660,655);

LineType 4;
```
% LINE Parameter Summary -------------------------------------- %
% BUNDLE    LINE            LINE      LINE                        %
% INDEX     TYPE            WIDTH     COLOUR                      %
% default   set             set       set                        %
% 1         4 dash-dot      2.0       2 red                       %
% -------------------------------------------------------------- %
```
Line (1638,983),(19660,983);

LineType 3;
```
% LINE Parameter Summary -------------------------------------- %
% BUNDLE    LINE            LINE      LINE                        %
% INDEX     TYPE            WIDTH     COLOUR                      %
% default   set             set       set                        %
% 1         3 dot           2.0       2 red                       %
% -------------------------------------------------------------- %
```
Line (1638,1311) (19660,1311);

LineType 2;
```
% LINE Parameter Summary -------------------------------------- %
% BUNDLE    LINE            LINE      LINE                        %
% INDEX     TYPE            WIDTH     COLOUR                      %
% default   set             set       set                        %
% 1         2 dash          2.0       2 red                       %
% -------------------------------------------------------------- %
```
Line (1638,1638) (19660,1638);

LineType 1;
```
% LINE Parameter Summary -------------------------------------- %
% BUNDLE    LINE            LINE      LINE                        %
% INDEX     TYPE            WIDTH     COLOUR                      %
% default   set             set       set                        %
% 1         1 solid         2.0       2 red                       %
% -------------------------------------------------------------- %
```
Line (1638,1966) (19660,1966);

% Labels in Boxes %
```
    TextFontIndex 3;
    TextPrec STROKE;
    CharExpan 0.8;
    CharSpace 0.01;
    TextColr 1;
    CharHeight 450;
    CharOri 0,1,1,0;
    TextPath RIGHT;
% TEXT PARAMETER SUMMARY ------------------------------------------------- %
% BUNDLE    FONT      TEXT          EXPAN      CHAR.      TEXT              %
% INDEX     INDEX     PRECISION     FACTOR     SPACE      COLOUR            %
% default   set       set           set        set        set              %
% 1         3         STROKE        0.8        0.01       1 black           %
%                                                                          %
% CHAR      CHAR.     TEXT          TEXT       CHAR SET   ALT CHAR          %
% HEIGHT    ORIENT    PATH          ALIGN      INDEX      SET INDEX         %
% set       set       set           default    default    default          %
% 450       0,1,1,0   right         normal     1          1                %
% --------------------------------------------------------------------- %
```

```
Text      164,24575,      final,      "(1) POLYLINE";
Text      5625,24575,     final,      "(2) DISJOINT";
Text      5625,23920,     final,      "  POLYLINE";
Text      11086,24575,    final,      "(3) POLYMARKER";
Text      16547,24575,    final,      "(4) TEXT";
Text      22008,24575,    final,      "(5) RESTRICTED";
Text      22008,23920,    final,      "  TEXT";
Text      27470,24575,    final,      "(6) APPEND";
Text      27470,23920,    final,      "  TEXT";
Text      164,14745,      final,      "(7) POLYGON";
Text      5625,14745,     final,      "(8) POLYGON";
Text      5625,14090,     final,      "  SET";
Text      11086,14745,    final,      "(9) CELL";
Text      11086,14090,    final       ," ARRAY";
% Not Included - - - - (10) GENERALIZED DRAWING PRIMATIVE (GDP) - %
Text      16547,14745,    final,      "(11) RECTANGLE";
Text      22008,14745,    final,      "(12) CIRCLE";
Text      27470,14745,    final,      "(13) CIRCULAR";
Text      27470,14090,    final,      " ARC 3 POINT";
Text      164,4915,       final,      "(14) CIRCULAR";
Text      164,4260,       final,      " ARC 3 POINT";
Text      164,3604,       final,      " CLOSE";
Text      5625,4915,      final,      "(15) CIRCULAR";
Text      5625,4260,      final,      " ARC CENTRE";
Text      11086,4915,     final,      "(16) CIRCULAR";
Text      11086,4260,     final,      " ARC CENTRE";
Text      11086,3604,     final,      " CLOSE";
Text      16547,4915,     final,      "(17) ELLIPSE";
Text      22008,4915,     final,      "(18) ELLIPTICAL";
Text      22008,4260,     final,      " ARC";
Text      27470,4915,     final,      "(19) ELLIPTICAL";
Text      27470,4260,     final,      " ARC CLOSE";
Text      1638,2359,      final,      "LINE  TYPE";

CharHeight 200;
```

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | set | set | set | set | % |
| % 1 | 3 | STROKE | 0.8 | 0.01 | 1 black | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 200 | 0,1,1,0 | right | normal | 1 | 1 | % |

```
Text 750,1966,final,"1.";
Text 750,1638,final,"2.";
Text 750,1311,final,"3.";
Text 750,983,final,"4.";
Text 750,655,final,"5.";
```

% Figure Label %
CharHeight 450;

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | set | set | set | set | % |
| % 1 | 3 | STROKE | 0.8 | 0.01 | 1 black | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 450 | 0,1,1,0 | right | normal | 1 | 1 | % |
| % | | | | | | % |

Text 22063,2621,final,"CALS TEST NETWORK";
Text 22063,1868,final,"MIL-D-28003";
Text 22063,1114,final,"Computer Graphics Metafile";
Text 22063,360,final,"File: CTN-01Id, Draft 91-10-03";

EndPIC;
EndMF;

Listing for CTN-01r.clr

```
BEGMF  "CTN-01rd";                                          % 91-10-03 11:00 %
    MFVersion  1;
    MFDesc "CTN-01rd, 91-10-03, MIL-D-28003/BASIC-1";
    MFElemList  "DRAWINGPLUS";
    VDCType REAL; % more usual: INTEGER %
    MaxColrIndex 255;
    RealPrec -32767.,32767.,6;
    ColrPrec 255;
    ColrIndexPrec 255;
    Fontlist  "HERSHEY:SIMPLEX_ROMAN","HERSHEY:DUPLEX_ROMAN",
          "HERSHEY:COMPLEX_ROMAN";

BegPic "All Graphical Primitive Elements";
    ColrMode INDEXED;
    LineWidthMode SCALED;
    MarkerSizeMode SCALED;
    EdgeWidthMode SCALED;
    VDCExt (0.0,0.0),(1.0,1.0);
    BackColr 255 255 255; % white %
```

| % MODE | SUMMARY | ------- | ------- | ------- | -------- | % |
|---|---|---|---|---|---|---|
| % | COLOUR | LINE WIDTH | MARKER SIZE | EDGE WIDTH | | % |
| % SCALING | SELECTION | SECIFICATION | SPECIFICATION | SPECIFICATION | | % |
| % default | INDEXED | SCALED | SCALED | SCALED | | % |

```
BegPicBody;
    ColrTable
                0                        %   index   color     %
                255     255     255      %   0       white     %
                0       0       0        %   1       black     %
                255     0       0        %   2       red       %
                0       255     0        %   3       green     %
                0       0       255      %   4       blue      %
                255     255     0        %   5       yellow    %
                255     0       255      %   6       magenta   %
                0       255     255      %   7       cyan      %
                255     255     255      %   8       white     %
                255     155     0;       %   9       orange    %
```

```
% Box grid %
    EdgeVis ON;
    EdgeWidth 2.0;
    LineType 1;
    LineWidth 2.0;
    LineColr 1;
```

```
% Box and horizontal grid lines %
% LINE Parameter Summary -------------------------------------------- %
```

| % BUNDLE | LINE | LINE | LINE | % |
|---|---|---|---|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 1 | 3.0 | 1 black | % |
| % ---------------------------------------------------------------- | | | | % |

```
Line  (0.0,0.0),(0.0,1.0),(1.0,1.0),(1.0,0.0),(0.0,0.0);
Line (0.0,0.7000000),(1.0,0.7000000);
Line (0.0,0.4000000),(1.0,0.4000000);
Line (0.0,0.1000000),(1.0,0.1000000);

% Vertical grid lines %
Line    (   .1666666,0.1),(0.1666666,1.0);
Line    (   .3333333,0.1),(0.3333333,1.0);
Line    (   .5000000,0.1),(0.5000000,1.0);
Line    (   .6666666,0.0),(0.6666666,1.0);
Line    (   .8333333,0.1),(0.8333333,1.0);

% Elements %

% Box  1 - POLYLINE %
    LineWidth 4.0;
    LineColr 2;
    % LINE Parameter Summary -------------------------------------------------    %
    % BUNDLE      LINE      LINE      LINE                        %
    % INDEX       TYPE      WIDTH     COLOUR                      %
    % default     set       set       set                        %
    % 1           1         4.0       2 red                       %
    %  -----------------------------------------------------------------------     %
    Line (0.0200000,0.82),(0.1466666,0.98),(0.1466666,0.94),
        (0.1033333,0.98),(0.0616666,0.98),(0.1466666,0.90),
        (0.1466666,0.86),(0.0200000,0.98),(0.0200000,0.94),
        (0.1466666,0.82),(0.1033333,0.82),(0.0200000,0.90),
        (0.0200000,0.86),(0.0616666,0.82);

% Box  2 - DISJOINT POLYLINE %
    LineWidth  3.0;
    LineColr 3;
    % LINE Parameter Summary -------------------------------------------------    %
    % BUNDLE      LINE      LINE      LINE                        %
    % INDEX       TYPE      WIDTH     COLOUR                      %
    % default     set       set       set                        %
    % 1           1         3.0       3 green                     %
    %  -----------------------------------------------------------------------     %
    DisjtLine (0.3133333,0.82),(0.1866666,0.98),(0.1866666,0.94),(0.2283333,0.98),
            (0.2700000,0.98),(0.1866666,0.90),(0.1866666,0.86),(0.3133333,0.98),
            (0.3133333,0.94),(0.1866666,0.82),(0.2283333,0.82),(0.3133333,0.90),
            (0.3133333,0.86),(0.2700000,0.82);

% Box  3 - POLYMARKER %
    MarkerType  1;
    MarkerSize 1.0;
    MarkerColr 1;
    % MARKER PARAMETER SUMMARY --------------------------------------    %
    % BUNDLE                                                      %
    % INDEX       TYPE      SIZE      COLOUR                      %
    % default = 1 1         1.0       1 black                     %
    %  -----------------------------------------------------------------------     %
    Marker (0.35,0.980);
```

```
MarkerType 2;
MarkerSize 2.0;
MarkerColr 2;
```

| % MARKER PARAMETER SUMMARY ----------------------------------- | | | | % |
|---|---|---|---|---|
| % BUNDLE | | | | % |
| % INDEX | TYPE | SIZE | COLOUR | % |
| % default = 1 | 2 | 2.0 | 2 red | % |
| % -------------------------------------------------------------- | | | | % |

```
Marker (0.38,0.940);


MarkerType 3;
MarkerSize 3.0;
MarkerColr 3;
```

| % MARKER PARAMETER SUMMARY ----------------------------------- | | | | % |
|---|---|---|---|---|
| % BUNDLE | | | | % |
| % INDEX | TYPE | SIZE | COLOUR | % |
| % default = 1 | 3 | 3.0 | 3 green | % |
| % -------------------------------------------------------------- | | | | % |

```
Marker (0.41,0.900);


MarkerType 4;
MarkerSize 2.0;
MarkerColr 4;
```

| % MARKER PARAMETER SUMMARY ----------------------------------- | | | | % |
|---|---|---|---|---|
| % BUNDLE | | | | % |
| % INDEX | TYPE | SIZE | COLOUR | % |
| % default = 1 | 4 | 2.0 | 4 blue | % |
| % -------------------------------------------------------------- | | | | % |

```
 Marker (0.44,0.860);


MarkerType 5;
MarkerSize 1.0;
MarkerColr 6;
```

| % MARKER PARAMETER SUMMARY ----------------------------------- | | | | % |
|---|---|---|---|---|
| % BUNDLE | | | | % |
| % INDEX | TYPE | SIZE | COLOUR | % |
| % default = 1 | 5 | 1.0 | 6 magenta | % |
| % -------------------------------------------------------------- | | | | % |

```
Marker (0.47,0.820);

% Box  4 - TEXT %
    TextFontIndex 1;
    TextColr 6;
    CharHeight 0.02;
    CharExpan 0.8;
    CharSpace 0.10;
    CharOri 0.0,1.0,1.0,0.0;
```

```
% TEXT PARAMETER SUMMARY --------------------------------------------------------  %
% BUNDLE    FONT     TEXT        EXPAN     CHAR.      TEXT              %
% INDEX     INDEX    PRECISION   FACTOR    SPACE      COLOUR            %
% default   set      default     set       set        set               %
% 1         1        1           0.8       0.10       6 magenta         %
%                                                                        %
% CHAR      CHAR.    TEXT        TEXT      CHAR SET   ALT CHAR          %
% HEIGHT    ORIENT   PATH        ALIGN     INDEX      SET INDEX         %
% set       set      default     default   default    default           %
% 0.02      0,1,1,0  right       normal    1          1                 %
% --------------------------------------------------------------------  %
```
Text 0.5200000,0.8200000,final,".ABCD";


TextColr 9;
CharOri -1.0,1.0,1.0,1.0; %
```
% TEXT PARAMETER SUMMARY --------------------------------------------------------  %
% BUNDLE    FONT     TEXT        EXPAN     CHAR.      TEXT              %
% INDEX     INDEX    PRECISION   FACTOR    SPACE      COLOUR            %
% default   set      default     set       set        set               %
% 1         1        1           0.8       0.10       9 orange          %
%                                                                        %
% CHAR      CHAR.    TEXT        TEXT      CHAR SET   ALT CHAR          %
% HEIGHT    ORIENT   PATH        ALIGN     INDEX      SET INDEX         %
% set       set      default     default   default    default           %
% 0.02      -1,1,1,1 right       normal    1          1                 %
% --------------------------------------------------------------------  %
```
Text 0.5200000,0.8500000,final,".ABCD";


TextColr 7;
CharOri 0.0,1.0,1.0,0.0;
TextPath LEFT;
```
% TEXT PARAMETER SUMMARY --------------------------------------------------------  %
% BUNDLE    FONT     TEXT        EXPAN     CHAR.      TEXT              %
% INDEX     INDEX    PRECISION   FACTOR    SPACE      COLOUR            %
% default   set      default     set       set        set               %
% 1         1        1           0.8       0.10       7 cyan            %
%                                                                        %
% CHAR      CHAR.    TEXT        TEXT      CHAR SET   ALT CHAR          %
% HEIGHT    ORIENT   PATH        ALIGN     INDEX      SET INDEX         %
% set       set      set         default   default    default           %
% 0.02      0,1,1,0  left        normal    1          1                 %
% --------------------------------------------------------------------  %
```
Text 0.6400000,0.9600000,final,"LEFT";

```
TextColr 4;
TextPath DOWN;
```

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | default | set | set | set | % |
| % 1 | 1 | 1 | 0.8 | 0.10 | 4 blue | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 0.02 | 0,1,1,0 | down | normal | 1 | 1 | % |
| % ------------- | | | | | | % |

```
Text 0.6400000,0.9600000,final,"DOWN";
```

% Box 5 - RESTRICTED TEXT %

```
    LineType 1;
    IntStyle EMPTY;
    TextColr 4;
    CharHeight 0.020;
    TextPath RIGHT;
```

| % CLOSED FIGURE PARAMETER SUMMARY | | | | | | | % |
|---|---|---|---|---|---|---|---|
| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | default | default | INDEX | default | set | % |
| % EMPTY | 4 blue | 1= | 1 | def=1 | 1 | 2.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | | | | | % |
| % COLOUR | VISIBIL. | POINT | | | | | % |
| % default | set | default | | | | | % |
| % 1 black | on | ll corn | | | | | % |
| % ------------ | | | | | | | % |

```
Rect 0.68,0.82,0.82,0.84;
Rect 0.68,0.86,0.78,0.90;
Rect 0.68,0.92,0.74,0.98;
```

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | default | set | set | set | % |
| % 1 | 1 | STROKE | 0.8 | 0.10 | 4 blue | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 0.02 | 0,1,1,0 | right | normal | 1 | 1 | % |
| % ------------ | | | | | | % |

```
RestrText 0.14,0.04,0.68,0.82,final,"AbCdEfGhIjK";
RestrText 0.10,0.05,0.68,0.86,final,"AbCdEfGhIjK";
RestrText 0.06,0.06,0.68,0.92,final,"AbCdEfGhIjK";
```

% Box  6 - APPEND TEXT %
   TextFontIndex 2;
   TextColr 2;
   CharHeight 0.02;
   CharExpan 0.8;
   CharSpace 0.10;
   CharOri 0.0,1.0,1.0,0.0;

% TEXT  PARAMETER  SUMMARY ---------------------------------------------------- %

| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| default | set | default | set | set | set | % |
| 1 | 2 | 1 | 0.8 | 0.10 | 2 red | % |
|  |  |  |  |  |  | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| set | set | set | default | default | default | % |
| 0.02 | 0,1,1,0 | right | normal | 1 | 1 | % |

% ---------------------------------------------------------------------------- %

Text 0.8533333,0.8500000,notfinal,".ABC";


   TextFontIndex 3;
   TextColr 4;
   CharHeight 0.03;

% TEXT  PARAMETER  SUMMARY ---------------------------------------------------- %

| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| default | set | default | set | set | set | % |
| 1 | 3 | 1 | 0.8 | 0.10 | 4 blue | % |
|  |  |  |  |  |  | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| set | set | set | default | default | default | % |
| 0.03 | 0,1,1,0 | right | normal | 1 | 1 | % |

% ---------------------------------------------------------------------------- %

ApndText  final,"+D";


% Box  7 - POLYGON %
   EdgeWidth 2.0;
   EdgeColr 4;
   IntStyle SOLID;
   HatchIndex 1;
   FillColr 5;

% CLOSED  FIGURE  PARAMETER  SUMMARY ------------------------------------------- %

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
| STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| set | set | set | default | INDEX | default | set | % |
| SOLID | 5 yellow | 1 = 1 | 1 | def = 1 | 1 | 2.0 | % |
|  |  |  |  |  |  |  | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR |  |  | % |
| COLOUR | VISIBIL. | POINT | INDEX | SET NDX |  |  | % |
| set | set | default | default | default |  |  | % |
| 4 blue | on | ll corn | 1 | 1 |  |  | % |

% ---------------------------------------------------------------------------- %

Polygon 0.02,0.52,0.0833333,0.68,0.14,0.52;

% Box 8 - POLYGON SET %
    IntStyle HATCH;
    FillColr 2;
    HatchIndex 2;
    EdgeWidth 1.0;
    EdgeColr 1;
    % CLOSED FIGURE PARAMETER SUMMARY --------------------------------------------------- %

| % INTERIOR | FILL | HATCH | PATTERN | EDGE | EDGE | EDGE | % |
|---|---|---|---|---|---|---|---|
| % STYLE | COLOUR | INDEX | INDEX | BUNDLE | TYPE | WIDTH | % |
| % set | set | set | default | INDEX | default | set | % |
| % HATCH | 2 red | 2 ||| | 1 | def = 1 | 1 | 1.0 | % |
| % | | | | | | | % |
| % EDGE | EDGE | FILL REF | CHAR SET | ALT CHR | | | % |
| % COLOUR | VISIBIL. | POINT | INDEX | SET NDX | | | % |
| % set | set | default | default | default | | | % |
| % 1 black | on | ll corn | 1 | 1 | | | % |

    % --------------------------------------------------------------------------------------- %
    PolygonSet 0.1866666,0.52,vis,
            0.23,0.66,vis,
            0.29,0.68,invis,
            0.32,0.52,closevis,
            0.225,0.56,vis,
            0.1866666,0.68,vis,
            0.29,0.55,closevis;

% Box 9 - CELL ARRAY %
    CellArray

| % P | | Q | | R | | n x | n y | CI | % | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| (.38,.68) | | (.44,.52) | | (.48,.68) | | 9 | 10 | 65535 | | | | |
| 2 | 0 | 3 | 0 | 4 | 0 | 5 | 0 | 6 | % | 101010101 | % | |
| 0 | 7 | 8 | 0 | 0 | 2 | 2 | 0 | 0 | % | 011001100 | % | |
| 3 | 7 | 8 | 0 | 0 | 0 | 4 | 2 | 2 | % | 111000111 | % | |
| 3 | 0 | 2 | 2 | 0 | 7 | 0 | 0 | 7 | % | 101101001 | % | |
| 3 | 0 | 3 | 0 | 4 | 0 | 6 | 0 | 6 | % | 101010101 | % | |
| 0 | 2 | 0 | 3 | 0 | 6 | 6 | 0 | 7 | % | 010101101 | % | |
| 0 | 3 | 0 | 0 | 5 | 0 | 6 | 3 | 0 | % | 010010110 | % | |
| 0 | 4 | 4 | 0 | 5 | 3 | 0 | 4 | 5 | % | 011011011 | % | |
| 0 | 5 | 5 | 0 | 0 | 3 | 4 | 0 | 7 | % | 011001101 | % | |
| 0 | 6 | 6 | 0 | 0 | 3 | 5 | 0 | 0; | % | 011001100 | % | |

% Box 10 not used; GDP not in MIL-D-28003 %

%Box 11 - RECTANGLE %
    FillColr 6;
    HatchIndex 3;
    EdgeWidth 10.0;
    EdgeColr 7;

```
% CLOSED FIGURE PARAMETER SUMMARY ------------------------------------------------- %
% INTERIOR    FILL        HATCH       PATTERN      EDGE       EDGE       EDGE       %
% STYLE       COLOUR      INDEX       INDEX        BUNDLE     TYPE       WIDTH      %
% set         set         set         default      INDEX      default    set        %
% HATCH       6 magenta      3 ///    1            def = 1    1          10.0       %
%                                                                                   %
% EDGE        EDGE        FILL REF    CHAR SET     ALT CHR                          %
% COLOUR      VISIBIL.    POINT       INDEX        SET NDX                          %
% set         set         default     default      default                         %
% 7 cyan      on          ll corn     1            1                               %
% ------------------------------------------------------------------------------- %
```
Rect (0.5200000,0.5200000),(0.6466666,0.6800000);

% Box 12 - CIRCLE %
    FillColr 4;
    HatchIndex 4;
    EdgeWidth 4.0;
    EdgeColr 3;

```
% CLOSED FIGURE PARAMETER SUMMARY ------------------------------------------------- %
% INTERIOR    FILL        HATCH       PATTERN      EDGE       EDGE       EDGE       %
% STYLE       COLOUR      INDEX       INDEX        BUNDLE     TYPE       WIDTH      %
% set         set         set         default      INDEX      default    set        %
% HATCH       4 blue      4 \\\       1            def = 1    1          4.0        %
%                                                                                   %
% EDGE        EDGE        FILL REF    CHAR SET     ALT CHR                          %
% COLOUR      VISIBIL.    POINT       INDEX        SET NDX                          %
% set         set         default     default      default                         %
% 3 green     on          ll corn     1            1                               %
% ------------------------------------------------------------------------------- %
```
Circle (0.7500000,0.6000000),0.075;

% Box 13 - CIRCULAR ARC 3 POINT %
    LineType 1;

```
% LINE Parameter Summary ----------------------------------------------- %
% BUNDLE      LINE        LINE        LINE                     %
% INDEX       TYPE        WIDTH       COLOUR                   %
% default     set         set         set                      %
% 1           1           3.0         3 green                  %
% --------------------------------------------------------------------- %
```
Arc3Pt (0.9800000,0.6500000) (0.8666666,0.5400000) (0.9500000,0.5200000);

% Box 14 - CIRCULAR ARC 3 POINT CLOSE (CHORD) %
    FillColr 5;
    HatchIndex 5;
    EdgeWidth 2.0;
    EdgeColr 9;

```
% CLOSED FIGURE PARAMETER SUMMARY ------------------------------------------  %
% INTERIOR   FILL      HATCH    PATTERN    EDGE      EDGE     EDGE            %
% STYLE      COLOUR    INDEX    INDEX      BUNDLE    TYPE     WIDTH           %
% set        set       set      default    INDEX     default  set             %
% HATCH      5 yellow  5  ###   1          def = 1   1        2.0             %
%                                                                            %
% EDGE       EDGE      FILL REF CHAR SET   ALT CHR                           %
% COLOUR     VISIBIL.  POINT    INDEX      SET NDX                           %
% set        set       default  default    default                          %
% 9 orange   on        ll corn  1          1                                %
% ------------------------------------------------------------------------  %
Arc3PtClose (0.1500000,0.3600000) (0.0333333,0.2400000) (0.1166666,0.2000000),chord;
```

% Box 15 - CIRCULAR ARC CENTRE %
```
    LineWidth  1.0;
    LineType 1;
% LINE Parameter  Summary ------------------------------------------------  %
% BUNDLE     LINE         LINE        LINE                                  %
% INDEX      TYPE         WIDTH       COLOUR                                %
% default    set          set         set                                  %
% 1          1            1.0         3 green                              %
% ------------------------------------------------------------------------  %
%           x     y      DXs  DYs DXe  DYe  rad   %
ArcCtr ( 0.25, 0.3), 0.18, 0.32, 0.28, 0.25, 0.075;
```

% Box 16 - CIRCULAR ARC CENTRE CLOSE (PIE) %
```
    HatchIndex 6;
    FillColr 2;
    EdgeColr 4;
    EdgeVis OFF;
% CLOSED FIGURE PARAMETER SUMMARY ------------------------------------------  %
% INTERIOR   FILL      HATCH    PATTERN    EDGE      EDGE     EDGE            %
% STYLE      COLOUR    INDEX    INDEX      BUNDLE    TYPE     WIDTH           %
% set        set       set      default    INDEX     default  set             %
% HATCH      2 red     6 xxx    1          def = 1   1        2.0             %
%                                                                            %
% EDGE       EDGE      FILL REF CHAR SET   ALT CHR                           %
% COLOUR     VISIBIL.  POINT    INDEX      SET NDX                           %
% set        set       default  default    default                          %
% 4 blue     off       ll corn  1          1                                %
% ------------------------------------------------------------------------  %
%           x     y      DXs   DYs   DXe   DYe   rad    type %
ArcCtrClose ( 0.416,  0.3),  0.18,  0.32,  0.48, 0.25,  0.075, pie;
```

% Box 17 - ELLIPSE %
```
    FillColr 9;
    HatchIndex 4;
    EdgeColr 6;
    EdgeVis ON;
```

```
% CLOSED FIGURE PARAMETER SUMMARY --------------------------------------------   %
% INTERIOR     FILL       HATCH    PATTERN      EDGE      EDGE      EDGE          %
% STYLE        COLOUR     INDEX    INDEX        BUNDLE    TYPE      WIDTH         %
% set          set        set      default      INDEX     default   set          %
% HATCH        9 orange   4 \\\    1            def = 1   1         2.0          %
%                                                                                %
% EDGE         EDGE       FILL REF CHAR SET     ALT CHR                          %
% COLOUR       VISIBIL.   POINT    INDEX        SET NDX                          %
% set          set        default  default      default                         %
% 6 magenta    on         ll corn  1            1                                %
% --------------------------------------------------------------------------     %
Ellipse (0.5833331,0.30),0.518,0.24,0.55,0.32;
```

```
% Box 18 - ELLIPTICAL ARC %
    LineWidth 6.0;
    LineType 1;
    % LINE Parameter Summary ------------------------------------------   %
    % BUNDLE    LINE       LINE         LINE                              %
    % INDEX     TYPE       WIDTH        COLOUR                            %
    % default   set        set          set                              %
    % 1         1          6.0          3 green                          %
    % ----------------------------------------------------------------    %
    EllipArc  (0.6800000,0.28),              % centre point              %
              (0.5846666,0.19),              % 1st CDP endpoint          %
              (0.5966666,0.31),              % 2nd CDP endpoint          %
              (0.04, 0.11),                  % DX_start,DY_start         %
              (0.10,-0.09);                  % DX_end,DY_end             %
```

```
% Box 19 - ELLIPTICAL ARC CLOSE (PIE) %
    FillColr 3;
    HatchIndex 2;
    EdgeWidth 4.0;
    % CLOSED FIGURE PARAMETER SUMMARY -----------------------------------------   %
    % INTERIOR     FILL       HATCH    PATTERN      EDGE      EDGE      EDGE        %
    % STYLE        COLOUR     INDEX    INDEX        BUNDLE    TYPE      WIDTH       %
    % set          set        set      default      INDEX     default   set        %
    % HATCH        3 green    2 |||    1            def = 1   1         4.0        %
    %                                                                             %
    % EDGE         EDGE       FILL REF CHAR SET     ALT CHR                        %
    % COLOUR       VISIBIL.   POINT    INDEX        SET NDX                        %
    % set          set        default  default      default                       %
    % 6 magenta    on         ll corn  1            1                             %
    % ---------------------------------------------------------------------       %
    EllipArcClose (0.85,0.28),             % centre point        %
                  (0.75,0.19),             % 1st CDP endpoint    %
                  (0.76,0.31),             % 2nd CDP endpoint    %
                  (0.04, 0.12),            % DX_start,DY_start   %
                  (0.10,-0.08),            % DX_end,DY_end       %
                  pie;
```

% Box "20" - LINE TYPE %
    LineColr 2;
    Linewidth 2.0;
    LineType 5;
    % LINE Parameter Summary --------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 5 dash-dot-dot | 2.0 | 2 red | % |
| % ----------------------------------------------------------------- | | | | % |

    Line (0.05,0.02),(0.6,0.02);

    LineType 4;
    % LINE Parameter Summary --------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 4 dash-dot | 2.0 | 2 red | % |
| % ----------------------------------------------------------------- | | | | % |

    Line (0.05,0.03),(0.6,0.03);

    LineType 3;
    % LINE Parameter Summary --------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 3 dot | 2.0 | 2 red | % |
| % ----------------------------------------------------------------- | | | | % |

    Line (0.05,0.04),(0.6,0.04);

    LineType 2;
    % LINE Parameter Summary --------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 2 dash | 2.0 | 2 red | % |
| % ----------------------------------------------------------------- | | | | % |

    Line (0.05,0.05),(0.6,0.05);

    LineType 1;
    % LINE Parameter Summary --------------------------------------------- %

| % BUNDLE | LINE | LINE | LINE | % |
|----------|------|------|------|---|
| % INDEX | TYPE | WIDTH | COLOUR | % |
| % default | set | set | set | % |
| % 1 | 1 solid | 2.0 | 2 red | % |
| % ----------------------------------------------------------------- | | | | % |

    Line (0.05,0.06),(0.6,0.06);

```
% Labels in Boxes %
    TextFontindex 3;
    TextPrec STROKE;
    CharExpan 0.8;
    CharSpace 0.10;
    TextColr 1;
    CharHeight 0.015;
    CharOri 0.0,1.0,1.0,0.0;
    TextPath RIGHT;
    % TEXT PARAMETER SUMMARY --------------------------------------------------  %
    % BUNDLE   FONT      TEXT        EXPAN     CHAR.      TEXT                     %
    % INDEX    INDEX     PRECISION   FACTOR    SPACE      COLOUR                   %
    % default  set       set         set       set        set                     %
    % 1        3         STROKE      0.8       0.10       1 black                  %
    %                                                                             %
    % CHAR     CHAR.     TEXT        TEXT      CHAR SET   ALT CHAR                 %
    % HEIGHT   ORIENT    PATH        ALIGN     INDEX      SET INDEX                %
    % set      set       set         default   default    default                 %
    % 0.015    0,1,1,0   right       normal    1          1                       %
    %  -------------------------------------------------------------------------- %
    Text      0.0050000,0.7500000,        final,      "(1) POLYLINE";
    Text      0.1716666,0.7500000,        final,      "(2) DISJOINT";
    Text      0.1716666,0.7300000,        final,      " POLYLINE";
    Text      0.3383333,0.7500000,        final,      "(3) POLYMARKER";
    Text      0.5050000,0.7500000,        final,      "(4) TEXT";
    Text      0.6716666,0.7500000,        final,      "(5) RESTRICTED";
    Text      0.6716666,0.7300000,        final,      " TEXT";
    Text      0.8383333,0.7500000,        final,      "(6) APPEND";
    Text      0.8383333,0.7300000,        final,      " TEXT";
    Text      0.0050000,0.4500000,        final,      "(7) POLYGON";
    Text      0.1716666,0.4500000,        final,      "(8) POLYGON";
    Text      0.1716666,0.4300000,        final,      " SET";
    Text      0.3383333,0.4500000,        final,      "(9) CELL";
    Text      0.3383333,0.4300000,        final,      " ARRAY";
% Not Included - - - - - - - - (10) GENERALIZED DRAWING PRIMITIVE (GDP) - %
    Text      0.5050000,0.4500000,        final,      "(11) RECTANGLE";
    Text      0.6716666,0.4500000,        final,      "(12) CIRCLE";
    Text      0.8383333,0.4500000,        final,      "(13) CIRCULAR";
    Text      0.8383333,0.4300000,        final,      " ARC 3 POINT";
    Text      0.0050000,0.1500000,        final,      "(14) CIRCULAR";
    Text      0.0050000,0.1300000,        final,      " ARC 3 POINT";
    Text      0.0050000,0.1100000,        final,      " CLOSE";
    Text      0.1716666,0.1500000,        final,      "(15) CIRCULAR";
    Text      0.1716666,0.1300000,        final,      " ARC CENTRE";
    Text      0.3383333,0.1500000,        final,      "(16) CIRCULAR";
    Text      0.3383333,0.1300000,        final,      " ARC CENTRE";
    Text      0.3383333,0.1100000,        final,      " CLOSE";
    Text      0.5050000,0.1500000,        final,      "(17) ELLIPSE";
    Text      0.6716666,0.1500000,        final,      "(18) ELLIPTICAL";
    Text      0.6716666,0.1300000,        final,      " ARC";
    Text      0.8383333,0.1500000,        final,      "(19) ELLIPTICAL";
    Text      0.8383333,0.1300000,        final,      " ARC CLOSE";
    Text      0.05,0.072,                 final,      "LINE TYPE";
```

CharHeight 0.007;

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | set | set | set | set | % |
| % 1 | 3 | STROKE | 0.8 | 0.10 | 1 black | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 0.007 | 0,1,1,0 | right | normal | 1 | 1 | % |
| % | | | | | | % |

Text (.0229,.060),final,"1.";
Text (.0229,.050),final,"2.";
Text (.0229,.040),final,"3.";
Text (.0229,.030),final,"4.";
Text (.0229,.020),final,"5.";

% Figure Label %

CharHeight 0.015;

| % TEXT PARAMETER SUMMARY | | | | | | % |
|---|---|---|---|---|---|---|
| % BUNDLE | FONT | TEXT | EXPAN | CHAR. | TEXT | % |
| % INDEX | INDEX | PRECISION | FACTOR | SPACE | COLOUR | % |
| % default | set | set | set | set | set | % |
| % 1 | 3 | STROKE | 0.8 | 0.10 | 1 black | % |
| % | | | | | | % |
| % CHAR | CHAR. | TEXT | TEXT | CHAR SET | ALT CHAR | % |
| % HEIGHT | ORIENT | PATH | ALIGN | INDEX | SET INDEX | % |
| % set | set | set | default | default | default | % |
| % 0.015 | 0,1,1,0 | right | normal | 1 | 1 | % |
| % | | | | | | % |

Text 0.67333333,0.0800000,final,"CALS TEST NETWORK";
Text 0.67333333,0.0570000,final,"MIL-D-28003";
Text 0.67333333,0.0340000,final,"Computer Graphics Metafile";
Text 0.67333333,0.0110000,final,"File: CTN-01Rd, 91-10-03";

EndPic;
EndMF;

## ATTACHMENT G                          Glossary

Clear Text:
One method for encoding a CGM, the other two being character encoding and binary. Of the three encodings, clear text is the most like English, and is thus easier for people to read than the number-oriented binary and character encodings. Multiple encodings exist as trade-offs between short file size and human readability. To be compatible with MIL-D-28003, a CGM must eventually be in binary format.

Computer Graphics Metafile:
The specification, as designated in ANSI/ISO 8632, for storing and transferring two-dimensional picture (lines and shapes) data.

Element:
A functional item that can be used to construct a picture or convey information. Examples are a circle, a line, a color, a linewidth, and text.

MIL-STD-1840A:
Military Standard, "Automated Interchange of Technical Information." This standard defines methods for the digital transmission of technical information necessary for the logistic support of weapons systems throughout their life cycle. MIL-STD-1840A acts as the "parent" standard for a suite of specifications, including MIL-D-28003 (CGM).

MIL-D-28003:
Military Specification, "Digital Representation for Communication of Illustration Data: CGM Application Profile." This specification establishes requirements for digital delivery of 2-dimensional vector images via the digital format of the CGM (Computer Graphics Metafile). MIL-D-28003 is a subset of the ANSI/ISO 8632 standard.

Pixel:
Picture Element. A computer screen displays a picture as a series of discrete rectangles or squares called pixels. Each pixel, the smallest unit of picture display, contains only one color-shaded value. Complex images can be formed, building upon the simple pixel, since the human eye tends to blend the colors into a continuous image.

Raster Data:
Image data stored (and transmitted) as a regular 2-D array of pixels.

Vector Data:
Image data stored (and transmitted) as lines. In the case of CGM, vector image data need not be limited to straight line segments, but may also consist of graphical elements such as circles, and arcs, defined by mathematical equations.

## ATTACHMENT H      List of Acronyms and Abbreviations

ANSI:            American National Standards Institute

ASCII:           American Standard Code for Information Interchange

CALS:            Computer-aided Acquisition and Logistic Support

CGM:             Computer Graphics Metafile

CTN:             CALS Test Network

DoD:             Department of Defense

ISO:             International Organization for Standardization, commonly known as
                 International Standards Organization in the United States

MIL-STD-1840A:   Military Standard, "Automated Interchange of Technical Information"

MIL-D-28003:     Military Specification, "Digital Representation for Communication of
                 Illustration Data:  CGM Application Profile"

Pixel:           Picture Element

2-D:             Two-dimensional